What is claimed is:

1. An air conditioner comprising:

a refrigerant circuit including a variable displacement compressor, first and second pressure monitoring points being located in the refrigerant circuit;

a control valve for adjusting its opening degree so as to vary a displacement of the compressor, the control valve including:

a valve body;

a pressure sensing mechanism operatively connected to the valve body, the pressure sensing mechanism including a pressure sensing member autonomically detecting a pressure differential between the first and second pressure monitoring points, the pressure sensing member moving in response to variation of the pressure differential, whereby the valve body is moved to vary the displacement of the compressor so as to cancel the variation of the pressure differential; and

an actuator for changing a set pressure differential in such a manner that force applied to the valve body is changed by an external command, the set pressure differential being a reference value of a motion for determining a position of the valve body by the pressure sensing mechanism;

a detector for detecting cooling load information in the refrigerant circuit;

a first calculator for calculating a target pressure in a relatively low

pressure region in the refrigerant circuit in response to the detected cooling load information;

a suction pressure sensor for detecting actual pressure in the relatively low pressure region in the refrigerant circuit; and

a compressor controller for controlling the actuator to eliminate a first differential between the calculated target pressure and the detected actual pressure.

2. The air conditioner according to claim 1, wherein the refrigerant circuit further includes an evaporator, the air conditioner further comprising:

a second calculator for calculating target after-evaporator temperature of air that has passed through the evaporator based upon the detected cooling load information; and

an evaporator sensor for detecting actual after-evaporator temperature of the air that has passed through the evaporator, wherein the compressor controller controls the actuator to eliminate the first differential when a second differential between the calculated target after-evaporator temperature and the detected actual after-evaporator temperature is greater than a first predetermined value, wherein the compressor controller controls the actuator to eliminate the second differential when the second differential is equal to or smaller than the first predetermined value.

3. The air conditioner according to claim 1, wherein force based upon a third differential between a discharge pressure in the refrigerant circuit and pressure in a crank chamber of the compressor affects positioning of the valve body in the control valve.

4. The air conditioner according to claim 1, wherein the first predetermined value is 2 degrees centigrade.

5. The air conditioner according to claim 1, wherein the refrigerant circuit further includes an evaporator, the control valve including an electromagnetic actuator, electromagnetic force generated by the electromagnetic actuator being adjusted by controlling a duty ratio of supplied electric current, the air conditioner further comprising:

a second calculator for calculating target after-evaporator temperature of air that has passed through the evaporator based upon the detected cooling load information; and

an evaporator sensor for detecting actual after-evaporator temperature of the air that has passed through the evaporator, wherein the compressor controller controls the actuator to eliminate a second differential between the detected actual after-evaporator temperature and the calculated target after-evaporator temperature when the duty ratio is greater than a second predetermined value, wherein the compressor controller controls the actuator to eliminate the first

differential when the duty ratio is equal to or smaller than the second predetermined value.

6. The air conditioner according to claim 1, wherein the refrigerant circuit further includes an evaporator, the compressor defining a suction chamber inside, the first pressure monitoring point is located in a suction pressure region between the evaporator and the suction chamber including the evaporator and the suction chamber, while the second pressure monitoring point is located downstream to the first pressure monitoring point in the suction pressure region.

7. The air conditioner according to claim 1, wherein the compressor is a swash plate type.

8. The air conditioner according to claim 1, wherein the detector includes a temperature setting device, a sensor for detecting a compartment temperature, a sensor for detecting ambient temperature and a sensor for detecting solar irradiance.

9. An air conditioner comprising:

a refrigerant circuit including a variable displacement compressor and an evaporator, first and second pressure monitoring points being located in the refrigerant circuit;

a control valve for adjusting its opening degree so as to vary a displacement of the compressor, the control valve including:

a pressure sensing mechanism including:

a pressure sensing member autonomically detecting a pressure differential between the first and second pressure monitoring points; and

a valve body operatively connected to the pressure sensing member, the pressure sensing member moving in response to variation of the pressure differential, whereby the valve body is moved to vary the displacement of the compressor so as to cancel the variation of the pressure differential; and

an actuator for changing a set pressure differential in such a manner that force applied to the valve body is changed by an external command, the set pressure differential being a reference value of a motion for determining a position of the valve body by the pressure sensing mechanism;

a detector for detecting cooling load information in the refrigerant circuit;

a first calculator for calculating target surface temperature on the evaporator in response to the detected cooling load information;

a surface temperature sensor for detecting actual surface temperature on the evaporator; and

a compressor controller for controlling the actuator to eliminate a first

differential between the calculated target surface temperature and the detected actual surface temperature.

10. The air conditioner according to claim 9, further comprising:

a second calculator for calculating target after-evaporator temperature of air that has passed through the evaporator based upon the detected cooling load information; and

an evaporator sensor for detecting actual after-evaporator temperature of the air that has passed through the evaporator, wherein the compressor controller controls the actuator to eliminate the first differential when a second differential between the target after-evaporator temperature and the detected actual after-evaporator temperature is greater than a predetermined value, wherein the compressor controller controls the actuator to eliminate the second differential when the second differential is equal to or smaller than the predetermined value.

11. A method of controlling an air conditioner including a refrigerant circuit and a control valve, the refrigerant circuit having a variable displacement compressor, the control valve adjusting its opening degree so as to vary a displacement of the compressor, the method comprising the steps of:

detecting cooling load information in the refrigerant circuit;

calculating target pressure in a relatively low pressure region in the refrigerant circuit based upon the detected cooling load information;

detecting actual pressure in the relatively low pressure region in the refrigerant circuit; and

controlling the control valve so as to eliminate a first differential between the calculated target pressure and the detected actual pressure.

12. The method of controlling the air conditioner according to claim 11, wherein the refrigerant circuit further includes an evaporator, the controlling step including:

calculating target after-evaporator temperature of air that has passed through the evaporator;

detecting actual after-evaporator temperature of the air that has passed through the evaporator;

comparing a second differential between the calculated target after-evaporator temperature and the detected actual after-evaporator temperature with a first predetermined value;

controlling the control valve to eliminate the first differential when the second differential exceeds the first predetermined value; and

controlling the control valve to eliminate the second differential when the second differential is within the first predetermined value.

13. A method of controlling an air conditioner including a refrigerant circuit and a control valve, the refrigerant circuit having a variable displacement

compressor and an evaporator, the control valve adjusting its opening degree so as to vry a displacement of the compressor, the method comprising the steps of:

detecting cooling load information in the refrigerant circuit;

calculating target surface temperature on the evaporator in the refrigerant circuit based upon the detected cooling load information;

detecting actual surface temperature of the evaporator in the refrigerant circuit; and

controlling the control valve so as to eliminate a differential between the calculated target surface temperature and the detected actual surface temperature.